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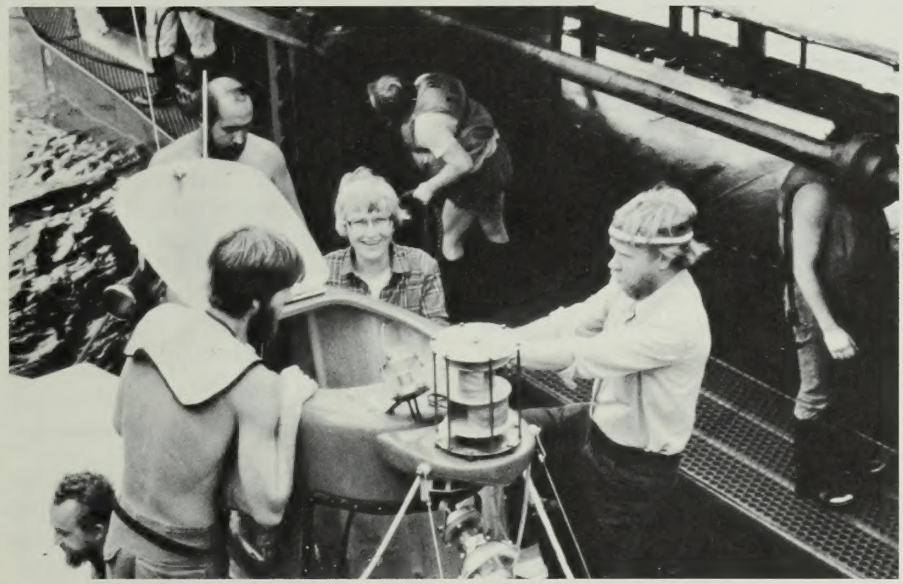
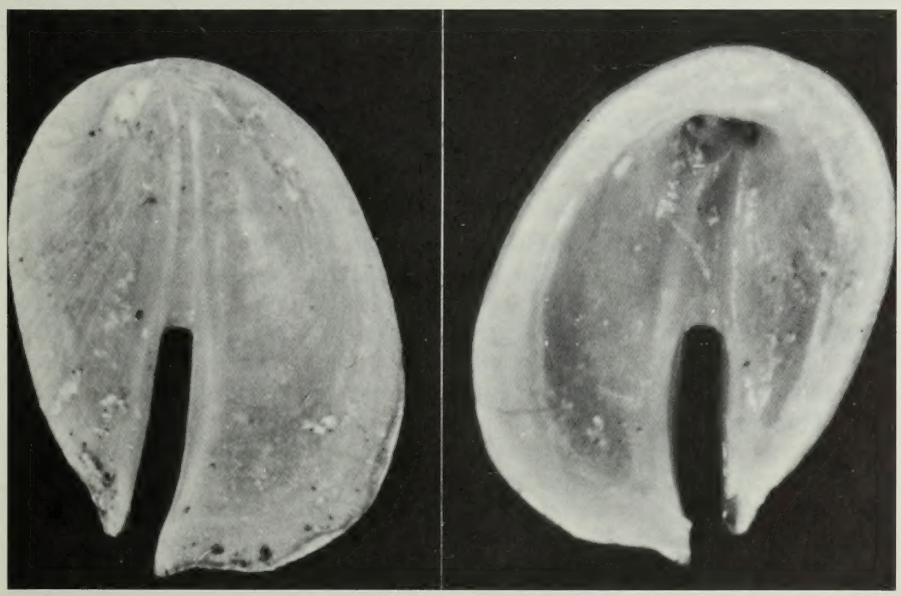
NEW DISCOVERIES FROM THE GALAPAGOS RIFT



Dr. Ruth Turner boarding the submarine ALVIN for descent to a thermal vent on the Galapagos Rift. At the right is Dr. Carl Wirsen, microbiologist at the Woods Hole Oceanographic Institution.



An undescribed limpet found in the vent area. The wide, oblique slit differentiates it from all known species. It is probably a living representative of a genus known in the fossil record from the Upper Jurrasic to the Eocene (135-60 million years ago).

Professor Ruth D. Turner of the Mollusk Department has been actively involved in the recent much-publicized expeditions aboard the deep-diving submarine ALVIN to the sea floor in the Galapagos Rift region.

Relating her findings from her deep-sea "wood island" experiments (see *MCZ Newsletter, Vol. 4 No. 3, 1975*) to the "islands" of hydrogen sulfide water issuing from the thermal vents on the Rift, Dr. Turner hypothesizes that the two situations are, to some extent, analogous. "Both these environments have persisted over sufficient time to allow for the evolution of unique families, genera, and species adapted to utilize the available food sources." Wood, a product of photosynthesis, on reaching the deep-sea is made available to a complex community of invertebrates by the activity of a unique group wood-boring bivalves restricted to the deep sea. Conversely, the food source at the thermal vents is based on chemosynthesis. Here, chemosynthetic bacteria oxidize hydrogen sulfide and utilize the energy in the fixation of organic matter.

Experimental work in deep-sea biology was initiated in 1968 as a result of a fortuitous accident during an ALVIN launch. Dr. Turner recalls: "ALVIN sank in 1540 meters of water about 110 miles south of Woods Hole, Massachusetts. When ALVIN was recovered after eleven months on the bottom, the lunches that were on board, though water-logged, were found to be well preserved. However, after being brought to the surface, they soon began to spoil even

BRYAN PATTERSON
1909-1979

When Bryan Patterson, Professor and Curator of Vertebrate Paleontology *emeritus*, died on December 1, he left his many friends at the MCZ and beyond deeply saddened. Many remembrances of this unusual man and expressions of sympathy at his loss were received by his widow Bea and son Alan from former colleagues, graduate students, and other admirers throughout the country.

Professor Patterson (or "Pat", as he was known to many) came to the MCZ in 1956 after spending 30 years at the Field Museum of Natural History in Chicago. His many achievements and exploits have been documented numerous times, including the *MCZ Newsletter, Volume 4, Number 3, Spring 1975* on the occasion of his retirement.

On January 9, a large gathering assembled in Harvard's Geological Lecture Hall for *A Celebration of the Life of Bryan Patterson*. In the warm reflections on that occasion, Pat's many memorable qualities were eloquently evoked. Following are some excerpts:

"There are many legends and myths woven together in the richly textured fabric that was the life of Bryan Patterson." *Keith S. Thomson*, Yale University, who was unable to attend but forwarded his reflections to Mrs. Patterson.

"I have often wondered when Pat received that letter from Al Romer and from Harvard while he was at the Field Museum, whether he fully understood and appreciated what he was getting himself into. Had he realized that he was taking on a series of graduate students over the next fifteen or twenty years, I am not at all sure he would have left the Field Museum . . . It was a great privilege for me to have been one of those graduate students and I certainly look back on my experiences with Pat and the things that he taught me as being the major highpoint of my career in paleontology." *Craig C. Black*, Carnegie Museum of Natural History, Pittsburgh

"When I arrived in Cambridge as a graduate student my first time east of the Mississippi River, out of the Nevada desert and scared to death, I walked in and met Pat and with a great guffaw he welcomed me, took me in and made room for me and made me feel that everyone else in the department had just also walked in off the Nevada desert. And then he left me alone. And I didn't want to be left alone, I wanted to be taken by the hand and led through whatever it was that graduate students were supposed to do and of which I had no idea. When I would go in to him for advice and counsel, he would simply send me back to do it myself. He did not expect his students to follow him." *William D. Sill*, University of Texas

"He was one of my finest friends and I suppose the very greatest thing that he has done for me is to have been, what he was to so many others, a catalyst. Much of what I have done, if it's anything, was inspired by knowing Bryan . . . Pat was a leader to me. He taught me to write. He was meticulous in his English . . . whenever I start to write, I think of Bryan as my editor." *Everett C. Olson*, University of California at Los Angeles

"Pat was a phenomenon. He had an insatiable curiosity, a compulsion to read—no, devour—the written word, a *joie de vivre* that converted almost every occasion into a once-in-a-lifetime experience. He commanded a wealth of knowledge within and beyond his field that was remarkable . . . all the more so because he was largely a self-taught man." *William D. Turnbull*, Field Museum of Natural History

"His expeditionary work was . . . peripatetic. He covered practically all the states in the United States where fossils are to be found in abundance. He worked in Colorado, Nebraska, Idaho, Utah, Wyoming, Florida as well as Argentina in the 50's and early 60's and later in Brazil and Venezuela. He engaged in . . . six field seasons in Kenya. It is a fitting tribute that his South American work was recently recognized. It was work that he had done in Guatemala and there, in appreciation for the advice and professional help so freely given, the authorities in the town of Estanzuela named the paleontological museum in his honor. So in Estanzuela there is the Museo de Paleontologia Bryan Patterson." *Farish A. Jenkins, Jr.*, Harvard University

"Charm and wit were some of Bryan's outstanding traits . . . no one in this speaker's experience commanded or returned loyalty like he . . . This profile would not be complete without a mention of Bryan's typically understated humanism and dedication to principles as, for instance, his joining the United States Army as a private and declining an officer's commission because he would not send others to their deaths . . . and the story of his capture in the Battle of the Bulge because he would not leave his sandwiches to the advancing Nazis . . . To those who knew him, Bryan Patterson was nothing short of a lovable living legend." *Eugene V. Prostov*, U.S.I.A. Retired, Washington, D.C.

"I came increasingly to relish his outlook on people and events: sardonic but kindly; informed by broad cultivation and wide experiences; free of illusion but equally free of bitterness; penetrating, intelligent, and spiced by wit . . . Bryan's vitality never diminished and his understanding continued to grow. He was planning new ventures when the Lord made him *emeritus*. With Bryan around, St. Peter will rapidly acquire a new view of Heaven." *Milton Katz*, Harvard Law School

From the many letters received by Mrs. Patterson, the following are a few excerpts:

"He was a man of wisdom and good judgment and without fear." *Carleton S. Coon*, retired, University of Pennsylvania

"Pat was a man to love and to enjoy. He carried himself with such style and grace . . . He took particular delight in savoring life's many follies and absurdities, and I especially loved that!" *Robert L. Trivers*, University of California, Santa Cruz

"I loved to find things for Pat because he always became excited. Other 'experts' were always too conservative, there was no fun finding things for them. But not Pat, wow! He jumped into the air, kicked his heels, and with loud exclamations gave you the utmost satisfaction for having discovered something even if it didn't amount to more than a finger bone off some obscure creature we already knew about." *Jim Jensen*, Brigham Young University

"He was always generous in his advice and helpful beyond the call of duty . . . There are not many like him and the world is poorer for his passing . . . There was not a mean molecule in him!" *Ernst Mayr*, MCZ

"I think back to our many conversations and relish them all—especially in the enlightenment *and* the twinkle that accompanied them all." *Stephen J. Gould*, MCZ

"It was stimulating and fun to know him. He was in no way bland. He was intolerant—of obfuscation, pomposity and fraud. He was not always kind—to those who deserved unkindness. He loved word play and was good at it. He was a fabulous teller of stories, a lunch-time concocter of myths and persons and places, a contriver at times of some wonderfully elaborate deceptions. He was more than a scientist—truly a man to be celebrated." *Ernest E. Williams*, MCZ

Photo by Christine Janis

Bryan Patterson with an aardvark, one of his favorite research animals.

Bone Man

When Bryan Patterson died
The Milky Way moved out
At some astronomical rate
And the sun set several seconds sooner
Than it did the day before;
The leaves had already been swept
From gutters, and most of us
Were worried about keeping warm.
Now, no amount of oil or coal or wood,
Uranium, alcohol or solarshine
Can heat our hollow core.

This man made bones live:

In evolutionary lines
Fleshed out with mutable genes
In changing Tertiary environments
Of adapting populations
And in the bodies of people about him.
He could launch a Field party
With a handful of words
(Or a scattering of letters
Put through amanuenses).
After days of dry search
A find of bone
Might get arroyo treatment
With champagne
Chilled in a sack
Soaked with acetone.
As he pressed in gathering twilight
Toward one more gravelly ridge
Or another gulch
He would see the humerus fragment
In alluvial deadpan.

I see him—reverent as a taeniodont—
Cycling through an establishment
On its antique two-wheeled showpiece
Or threatening to immolate with Viking fire
His team's immobile motor car
Somewhere in the canyons of Kenya
Or pulling verbiage
In the manuscript garden
A weed between his lips.
I knew him from
Aardvark to
Butterfly
And sensed his rich
Encyclopedic range.

John M. Burns,
National Museum of Natural History,
Smithsonian Institution,
Washington, D.C.

TRAVEL PROGRAM

Friends Return from Two Adventures

Both this year's Friends' trips exceeded past ones in distance and daring and travelers returned with exciting stories and slides.

Kenya, Madagascar, and Tanzania

The itinerary for this natural history expedition, organized by Emily Hubbs Scott and led by Professor Don Fawcett and ornithologist Don Turner, took participants through some of Kenya's game parks and a perfect viewing of the total solar eclipse on February 16.

Madagascar's unique flora and fauna as well as the haunting mystery of this remote, seldom-visited island, fascinated the group. Many took advantage of being in the capitol city of Tananarive on Friday to visit the famed market and purchased gem stones, fabrics, and other local craft items, while others made a side trip to the rain forest in the northeast.

Tanzania, with its large game populations, provided a dramatic climax to the adventure. Visits to tented safari camps were punctuated by a stay at a picturesque coffee farm. Olduvai Gorge and its museum was an awe-inspiring stop and the incomparably beautiful Ngorogoro Crater, with thousands of flamingoes in the crater lake, lions, cheetahs, countless Thompson's gazelles, and zebras provided the group's only view of rhinoceros. Sadly, the latter have been quite thoroughly poached for the supposed aphrodisiac qualities of their horns. While the rains did not arrive exactly on schedule, slightly delaying the vast wildebeest migration, the magnificence of the Serengeti, where the last three days were spent, left an indelible impression on the entire group.

Photo by Emily Hubbs Scott

A ring-tailed lemur (Lemur Catta) *from southern Madagascar.*

Galapagos Islands

This year's 17-day trip aboard the 16-passenger yacht ISABELA gave trip members an opportunity to visit all the major islands, including Tower, and to see the enormous Galapagos tortoises in the wild. Led by Dr. Kenneth I. Miyata, the leisurely pace allowed ample time for trip members to fully explore these intriguing islands.

Friends Trips For 1981:

The following trips are planned for 1981:

Baja—January 28-February 4: after a year off, we will be returning to this ideal place to see gray whales in their mating and calving grounds and as in the past, will pay visits to several Pacific islands to see elephant seals, sea lions, a variety of shore birds, and desert flora.

Hawaii—February 21-March 9: this time we will be visiting six islands including Hawaii (the big island), Maui, Kauai, Molokai, Lanai, and Oahu to see volcanoes, whales, forest birds, coral reef fish and the lush tropical flora of these beautiful islands. The emphasis, as in the past, will be to get away from the tourist areas to see the "real" Hawaii; however, the final two days will again be spent in Honolulu to visit the Bishop Museum, the Academy of Art, and the Iolani Palace.

Galapagos Islands—July 14-28: MCZ Professor and Curator Stephen J. Gould, author of *Ever Since Darwin* and monthly *Natural History* column "This View of Life", will accompany this ten-day tour of all the major islands, including Tower, aboard the *ss Santa Cruz*, the newest, fastest, and most comfortable vessel now available for this expedition. Among the advantages of a July visit: relatively cool temperatures and the opportunity of seeing waved albatrosses nesting on Hood Island.

A brochure describing all these trips will be mailed in June; itineraries will be available at that time from the Friends' office.

Photo by Catherine Nelson

Waved albatrosses (Diomedea irrorata) *on Hood Island return in time for late March viewing.*

Extra Provincetown Weekend Added

A column in *The New York Sunday Times Travel Section* of April 20 announcing the Friends of the MCZ fifth annual whale-watching expeditions off Provincetown evoked such an overwhelming response that a third weekend (June 27, 28) has been added. As of this writing, the weekends of May 10, 11 and May 31, June 1 are entirely filled and whale-watchers from New York, New Jersey, Pennsylvania, Indiana, and even as far away as Illinois, are signing up to see whales with the MCZ in June.

The recent upsurge in interest in seeing whales is viewed, by those concerned with their survival, as a promising sign. Since economics tend to overshadow ethics in most areas, and animal conservation is no exception, now that whales, at least in the New England region, are becoming more financially profitable alive than dead, the chances for their continued protection appear to be enhanced. According to a study by Scott Kraus, scientific guide for the first weekend, whale-watching in New England generated more than $1 million last season and while figures are not yet in for this year, they are undoubtedly a great deal higher.

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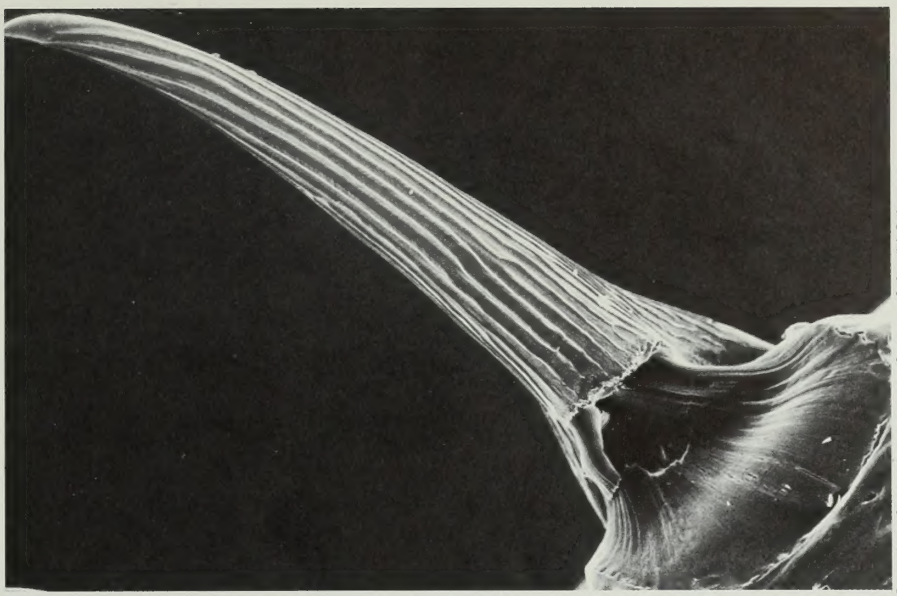


Scanning electron microscope photograph by Ed Seling

Hinged tooth of a dragonfish, Bathophilus ater. *The hinge allows the tooth to bend posteriorly so that prey can slide from it during swallowing.*

STRANGE FISHES

Dr. William L. Fink of the MCZ's Fish Department has recently received a grant from the National Science Foundation to continue his study of an intriguing group of deep-sea fishes know as "dragonfishes". Members of the very large and old family Stomiatidae (thought to date back to the late Jurassic, 150 million years ago), these fishes have evolved numerous bizarre specializations. Luminous chin barbels, pectoral fins with highly-mobile luminous tissue-tipped rays, large rapier-like lower jaw teeth which may insert in sockets over the eyes, and absence of the floor of the mouth are just a few of the unusual features of various members of this family. According to Dr. Fink: "These specializations appear to be associated with the capture and swallowing of large prey."

Studying this family of fishes is a challenging task since they are difficult to catch for a number of reasons: 1) they are high in the food chain so they are relatively rare; 2) they inhabit the largely inaccessible deep mid-water region; and 3) they are powerful swimmers and are thus able to avoid their would-be captors' nets. Scientists have not even been able to determine their maximum size; a large Danish vessel using a very large net in the early 1970's caught fishes two or three times as large as those previously thought to be full-grown adults. Attempts to view these fish through submersibles have also been unrewarding; sightings have been rare and brief. Even when finally caught, these fish do not survive long in aquaria. Consequently, studies of morphological specializations are limited to preserved specimens in collections. Fortunately, the MCZ's collections, with the recent additions of the Woods Hole holdings, are relatively extensive.

A deepwater dragonfish with barbel tipped with luminous organ. The white dots along the body are light organs which can be regulated to the surrounding light to make the fish invisible while stalking prey. From E. Fuzmayer, 1911. Resultats des Campagnes Scientifiques accomplies sur son yacht por Alber I.

SPRING VISITOR

Professor Russell V. Baudinette of Flinders University, South Australia is Alexander Agassiz Visiting Lecturer in Zoology this spring semester and taking part in Biology 121: *Structure and Physiology of the Vertebrates* with Professors Crompton, Jenkins, Liem, and Taylor.

Dr. Baudinette's research work is aimed at understanding the ways that animals use water and energy. He has taken Dr. C. Richard Taylor's model for the energetics of locomotion and has demonstrated its applicability to marsupials such as kangaroos and the Tasmanian devil in Australia. The use of water in the dissipation of heat generated during locomotion has also been investigated.

A one-week-old pygmy goat, offspring of one of Dr. Baudinette's research subjects.

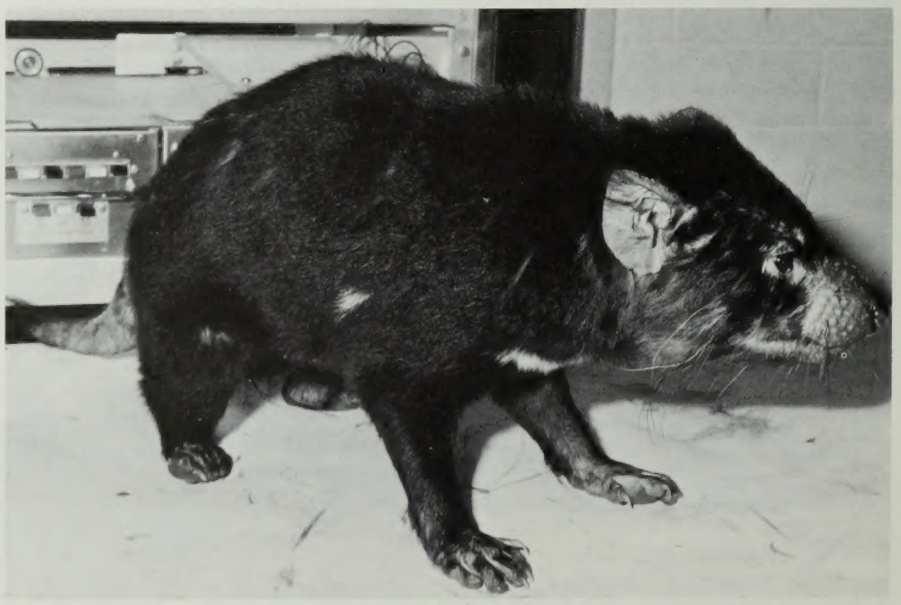
At the MCZ's Concord Field Station, Dr. Baudinette is measuring gas exchange across the lungs of various animals including wolves, coyotes, foxes, cows, goats, and reindeer, using oxygen measuring masks while running the animals on the treadmill. Differences in maximum oxygen consumption rates have been shown among these animals, and experiments are now determining if the diffusing area of the lung is the limiting factor.

Together with Dr. Vaughan Langman, Dr. Baudinette is studying heat balance in reindeer to answer the question: how does an animal designed to withstand cold

Dr. Russell Baudinette with reindeer at the Concord Field Station. These animals replace their antlers annually, just in time for Christmas!

dissipate the heat it generates while running? By running the animal on a treadmill and measuring evaporation from the skin and lungs, Dr. Baudinette is finding that reindeers may rely primarily on radiation from the body surface to dispose of unwanted heat.

Dr. Baudinette is also interested in the role of foreign compounds, or xenobiotic metabolism, particularly in desert animals. Many compounds which cannot be used by the body are biochemically altered and voided in the urine. Since desert animals have a low water output they are more vulnerable to compounds like pesticides. It appears that in the process of adapting to a desert environment by decreasing water needs, an animal increases its vulnerability to foreign compounds.



A Tasmanian devil at Dr. Baudinette's research lab at Flinders University, South Australia.